

A NEW SUBSPECIES OF *ROSA STELLATA*
(ROSACEAE) FROM NORTHWESTERN ARIZONA

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ABSTRACT

Rosa stellata subspecies *abyssa*, a new taxon from the rims of the Grand Canyon and Kanab Canyon in northwestern AZ, is described and illustrated. It differs from related taxa in having densely bristly hypanthia and densely stipitate-glandular stems.

Although *Rosa stellata* Wooton has been known from Coconino and Mohave counties, Arizona, since it was first collected in the Grand Canyon region in 1908 (Kearney and Peebles 1960), Arizona specimens were not included in the most recent monograph of *Rosa* subgenus *Hesperhodos* (Lewis 1965). New population found by several investigators on the rims of the Grand Canyon and Kanab Canyon on the Arizona Strip in Mohave Co., Arizona, during the course of floristic surveys for the Bureau of Land Management, US Fish and Wildlife Service, Lake Mead National Recreation Area, and Grand Canyon National Park, have increased our understanding of its distribution and habitat requirements. The Arizona populations represent a distinct taxon, and a disjunction of at least 750 km from the nearest localities in New Mexico.

***Rosa stellata* Wooton subspecies *abyssa* A. Phillips, subsp. nov.** (Fig. 1).—TYPE: USA, Arizona, Mohave Co.: SW edge of Shivwits Plateau, along W rim of Twin Point, 18 km S of Oak Grove, T30N R12W NW¼ sect. 7, 36°01'N, 113°37'W, 1823 m, in sandy to gravelly soils with limestone chips, derived from Kaibab limestone, in first 100 m from edge of plateau, open Great Basin conifer woodland, 15 Jun 1980, *A. M. Phillips, III, 80-103* (holotype, ARIZ; isotypes, ASC, ASU, DES, MNA, MO, NY, UNLV, UNM, US, Lake Mead National Recreation Area herbarium).

Frutex clonibus caulibus plurimus rigidis erectis, 0.25–1.5 m longis armatus spinis plurimis longis rectis. Caules dense stipitati glandulosi. Folia foliosis tribus usque ad quinque obovatis, grosse serratis insuper medium. Flores 5 cm diametro, solitari, terminales; hypanthium et sepala dense hispida aculeis longis crassis. Fructu sphaeroideum. Semina fusca laevia 4 mm longa.

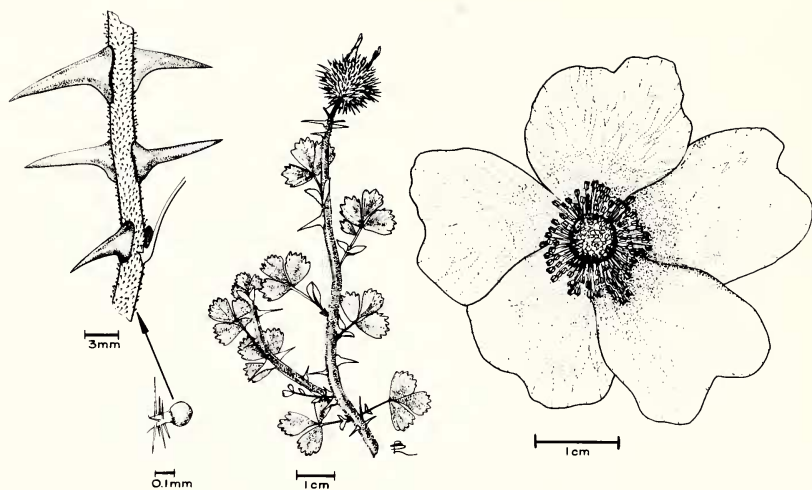


FIG. 1. *Rosa stellata* subsp. *abyssa*. Stem and stipitate gland, fertile stem with fruit, and flower. Drawn from the holotype (A. M. Phillips, III 80-103) and paratype (A. Phillips and B. Phillips 79-742) by Pamela S. Lungé. Used with permission of US Fish & Wildlife Service.

Clonal shrub with numerous stiff upright stems, 0.25–1.5 m long and armed with numerous long straight white to straw-colored paired infrastipular spines and with or without scattered internodal bristles and prickles. Stems brown, densely pubescent with short stipitate glands, these often encircled by stiff, white, stellately-arranged basal pubescence. Leaves with 3–5 obovate leaflets 5–12 mm long and 3–9 mm wide, cuneate at base, with 4–8 crenate or dentate coarse serrations above the widest part, occasionally minutely doubly serrate, bearing minute white sericeous pubescence on the margins, upper surface, and rachis, and few to numerous glands on leaflets immediately below the inflorescence; stipules adnate to the petiole, foliaceous above. Flowers solitary, terminal, about 5 cm across, sepals ovate-lanceolate, stiff, to 25 mm long, the free tips caudate-acuminate and slightly spatulate, often linear lobed, densely long-bristly below the tip, persistent and erect in fruit; petals obovate, dark pink, 15–20 mm wide, 17–25 mm long; hypanthium densely covered with long, stout, straight prickles, some gland-tipped. Fruit spheroid, 10–18 mm in diameter; seeds brown, smooth, about 4 mm long. Flowering May–June, fruiting September.

Paratypes. USA, AZ, Mohave Co.: type locality, 23 Sep 1979, in fruit, A. Phillips and B. Phillips 79-742 (ARIZ, ASC, ASU, DES, MNA, MO, NY, UNLV, UNM, US, Lake Mead National Recreation Area herbarium); 27 Jul 1975, *Holland 690* (UNLV); W rim

of Kanab Canyon, gravelly soil, T38N R3W sect. 30, 1585 m, 2 Aug 1977, *Gierisch 3978* (ASC, ASU); 8 Jun 1978, *Gierisch 4388* (ARIZ, ASU, USDA Forest Service Herb., Albuquerque, NM); W rim of Kanab Canyon in small drainage 30 m from edge, restricted to Kaibab limestone conglomerate, T38N R3W NW $\frac{1}{4}$ sect. 29, 1550 m, 13 Jun 1979, *A. Phillips and B. Phillips 79-624* (MNA); W rim of Kanab Canyon S of Water Canyon, in depression caused by breccia pipe collapse, T38N R3W NW $\frac{1}{4}$ SW $\frac{1}{4}$ sect. 8, 1525 m, 22 May 1980, *A. Phillips 80-91* (ARIZ, ASC, ASU, MNA, UNLV, UNM, BLM Arizona Strip District herbarium); Grand Canyon National Monument (Park), head of SB Trail, 1372 m, 24 May 1958, *Riffey s.n.* (UNLV, COLO); between SB Point and Hades Knoll, side canyon, 1675 m, 30 May 1978, *Reichhardt 123* (MNA). Coconino Co.: Mesa Eremita, S rim of Grand Canyon, 1980 m, 12 Jun 1935, *Hawbecker s.n.* (Grand Canyon National Park Study Collection); Dutton Point, N rim of Grand Canyon, dry ledge overlooking canyon, 2285 m, 17 Jul 1947, *Bryant and Cooper s.n.* (Grand Canyon National Park Study Collection, 2 specimens).

Specimen not examined. AZ: Coconino Co., Powell Plateau, N rim of Grand Canyon, in a dry, rocky situation, *Ferriss s.n. in 1908*, cited in Kearney and Peebles (1960), location of specimen unknown.

Habitat and distribution. *Rosa stellata* subsp. *abyssa* is known from Mesa Eremita on the South Rim of the Grand Canyon, and from Twin Point, Dutton Point, between Hades Knoll and SB Point, and W rim of Kanab Canyon, N of the Grand Canyon. All known populations are on or near canyon rims or the tops of cliffs at the edges of mesas or plateaus, suggesting the subspecific epithet.

The Twin Point population is the largest known, consisting of 1000–2000 stems in 10,000 m² when studied in 1979 (Phillips and Phillips 1982). They were growing in thin sandy-gravelly soils with limestone pebbles, overlying the Kaibab limestone bedrock, in an open Great Basin conifer woodland (Brown and Lowe 1980) with *Juniperus osteosperma* (Torrey) Little, *Purshia stansburiana* (Torrey) J. Henrickson, *Ephedra nevadensis* Watson, and *Yucca baccata* Torrey. Although the edge of the population was abrupt, there was no apparent corresponding change in habitat. No additional populations were found on Twin Point or on nearby Kelley Point in similar areas.

In contrast, three small localities in a 3 km long area along the W rim of Kanab Canyon, approximately 120 km E of Twin Point, are confined to areas that are geologically distinctive, shallow depressions at the upper ends of collapsed breccia pipes. A thin deposit of the Timpoweap Member of the Moenkopi Formation in the depressions represents ancient stream deposition at the contact with the upper member of the Kaibab Formation (G. Billingsley, USGS,

Flagstaff, AZ, personal communication). The rarity of the taxon at Kanab Canyon is apparently due to its restriction to this specific, limited substrate. Associated species within the Great Basin Desertscrub (Brown 1982) include *Purshia stansburiana*, *Berberis fremontii* Torrey, *Fallugia paradoxa* (D. Don) Endlicher, and *Yucca baccata*. BLM personnel in 1986 reported the loss of all plants in the two southern localities, T38N R3W sect. 29 and 30, without stating the cause, while the larger locality about 4 km N in sect. 8 remained vigorous. Uranium mining, often focusing on breccia pipes near canyon rims, was identified in the status report by Phillips and Phillips (1982) as a major potential threat. Although the Kaibab North Mine has subsequently been developed 1.5 km south of the sect. 8 site, no plants are known to have been lost due to uranium mining or associated activities.

Relationships. In his systematic treatment of *Rosa* subgenus *Hesperhodos* Cockerell ex Rehder, Lewis (1965) recognized two subspecies of *R. stellata*: *R. s. subsp. stellata* of the Organ and San Andres mts., Doña Ana County, New Mexico; and *R. s. subsp. mirifica* (Greene) W. H. Lewis of the Sacramento and White mts., Otero county, New Mexico, Guadalupe Mts., Culberson County, Texas, and Eagle Mts., Hudspeth County, Texas. The most apparent morphological difference between *R. s. subsp. abyssa* and all other taxa of *R. stellata* is the consistent presence of very robust, dense prickles on the hypanthium of the Arizona specimens. Although the hypanthium prickles are somewhat variable in the specimens from New Mexico and Texas, they are not as dense as in Arizona specimens.

The Arizona taxon appears to be most closely related to *R. s. subsp. stellata* based on the presence of stellately-arranged stiff hairs and gland-tipped projections on the young stems of most specimens of both taxa. The "stellate hairs" on the stems of *R. s. subsp. stellata*

TABLE 1. COMPARISON OF STEM AND HYPANTHIUM INDUMENTUM FOR THE THREE SUBSPECIES OF *ROSA STELLATA*.

	<i>R. s. ssp.</i> <i>abyssa</i>	<i>R. s. ssp.</i> <i>stellata</i>	<i>R. s. ssp.</i> <i>mirifica</i>
Stems			
Stalked glands with basal hairs	Present or absent	Present	Rare
Stellate hairs without stalked glands	Absent	Abundant	Absent
Prickles without apical glands	Absent	Rare	Abundant
Prickles with apical glands	Rare	Rare	Abundant
Hypanthium prickles			
Avg. no./5 mm	9.4	3.9	4.6
Range	4-17	2-5	3-8
Avg. length (mm)	4.0	1.6	2.8
Range (mm)	2.0-6.0	1.0-2.5	1.7-5.0

appear to have originated as a ring of minute, stiff, white hairs around the base of a gland-tipped projection. After many of the projections were reduced and lost, the stiff basal hairs remained on the stem in a stellate pattern. In *R. s.* subsp. *abyssa* the projections have not been lost or reduced, and the stiff, white hairs, when present, form a ring around the base of a prominent stipitate gland. The projections range from abundant soft-stalked glands to stiff gland-tipped prickles, which are usually rare.

Stellatey-arranged pubescence and soft stipitate glands are both generally absent in *R. s.* subsp. *mirifica*, which has abundant small, stiff internodal bristles and prickles, with or without terminal glands. Comparisons of stem indumentum and hypanthium prickle characteristics for three subspecies of *R. stellata* are shown in Table 1.

Stipitate glands are a consistently prominent and abundant feature on Arizona specimens from all localities. Plants from Kanab Creek and Mesa Ermita populations generally have fewer stiff hairs at the base of the gland-tipped projections, and somewhat shorter, less robust prickles on the hypanthia than plants from the Shivwits Plateau. There are usually a few hairs on some stipitate glands on the upper parts of fertile stems, however, and the gland-tipped projections themselves seem to be otherwise identical to those of the Shivwits Plateau plants. As some of the latter also lack pubescence on the stipitate glands, and since characteristics of the pubescence are so variable in New Mexico and Texas populations and taxa, I recognize but a single taxon in northwestern Arizona.

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